Radio frequency electromagnetic fields from mobile phones

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10.1 Introduction

Today, technology is cheaper and more widely available to ever before. Hence, most people are exposed to microwaves, either passively or by choice, most of the time. Electromagnetic radiation in the microwave range is used for mobile phone communication. There are more than 4.3 billion mobile phone users in the world [1] and more than 17.2 million (~86% of the population) in Australia in 2006. Usage is still increasing among all age groups. With the advance of communication technology in the radio frequency (RF) region, studying the biological effects of electromagnetic fields (EMFs) has become a significant area of research. Magnetic fields (MFs) act only on moving ions whereas electric fields (EFs) act on static as well as moving ions.

This research area has generated conflicting results and thus uncertainty regarding possible adverse health effects [2, 3]. The International Committee of Non-Ionizing Radiation Protection (ICNIRP) for limited exposure to low frequency EMFs and microwaves, aims to protect against nerve stimulation and body heating, respectively. About 30 years ago, the question arose whether weak, low frequency EMFs constituted a major health hazard. This question has still not been answered satisfactorily, particularly in the case of long exposure. Many epidemiological studies on residential and occupational exposure to extremely weak low frequency (ELF) MFs show varying, but in general positive, associations with different cancer forms, such as leukemia, brain tumors and breast cancer. A positive association was found especially for leukemia in children with residential exposure from power lines. Risks exceeded about 50% for exposure levels averaging over 0.4 µT [4]. The National Institute of Environmental Health Sciences (NIEHS) of the US classifies EMFs as a "possibly" carcinogenic (that might transform normal cells into cancer cells). Other investigations focused on: pregnancy outcomes in women working with visual display units, neurologic and psychiatric characteristics (Alzheimer's disease, multiple